

TETANUS

Also known as: Lockjaw disease

Responsibilities:

Hospital: Report by IDSS, facsimile, mail or phone

Lab: Report by facsimile, mail or phone

Physician: Report by IDSS, facsimile, mail or phone

Local Public Health Agency (LPHA): Report by IDSS, mail, facsimile, or phone. Follow-up required

Iowa Department of Public Health

Disease Reporting Hotline: (800) 362-2736

Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

Tetanus is caused by a potent toxin produced by *Clostridium tetani*, a spore-forming, anaerobic, gram-positive bacillus.

B. Clinical Description

Generalized tetanus is an acute, often fatal neurologic disease characterized by painful skeletal muscular contractions. The toxin blocks nerve signals telling muscles not to contract in response to voluntary contractions of opposing muscles. Onset is gradual, occurring over 1 - 7 days. The muscle stiffness usually first involves the jaw (lockjaw) and neck and progresses to severe generalized muscle spasms, which frequently are aggravated by any external stimulus, such as a loud noise. Severe spasms persist for one week or more and subside over a period of weeks in those who recover. *C. tetani* usually enters the body through a penetrating or puncture wound. In the presence of anaerobic (low oxygen) conditions, the spores germinate. Toxins are produced, and disseminated via blood and lymphatics. Toxins act at several sites within the central nervous system, including peripheral motor end plates, spinal cord, brain, and sympathetic nervous system. The typical clinical manifestations of tetanus are caused when tetanus toxin interferes with release of neurotransmitters, which block inhibitor impulses, resulting in sustained spasms. This leads to unopposed muscle contraction and spasm. Seizures may occur, and the autonomic nervous system may also be affected.

Neonatal tetanus, which arises from infection of the umbilical stump, is a form of generalized tetanus. However, inability to nurse is the most common presenting sign. Localized tetanus is manifested by local muscle spasms in areas contiguous to a wound, although history of an injury or an apparent portal of entry may be lacking. Cephalic tetanus is a rare form of the disease and involves the cranial nerves, especially the facial area. It is associated with infected wounds of the head and neck, including ear infections. Both localized and cephalic tetanus may precede generalized tetanus.

Complications of the disease include laryngospasm (spasm of the vocal cords) and/or spasm of the muscles of respiration, leading to interference with breathing; fractures of the spine or long bones, resulting from sustained contractions and convulsions; and hyperactivity of the autonomic nervous system, which may lead to hypertension and/or an abnormal heart rhythm. Other complications may include increased susceptibility to nosocomial infections, pulmonary embolism (particularly in drug addicts and elderly patients), and aspiration pneumonia. The case-fatality rate ranges from 10% - 90%; it is highest in infants and the elderly and varies inversely with the length of the incubation period and the availability of experienced intensive care unit personnel and resources.

Tetanus disease does not confer immunity. Patients who survive the disease should be given a complete series of vaccine.

Laboratory confirmation is of little help. The organism is rarely recovered from the site of infection, and usually there is no detectable serological response.

C. Reservoirs

Clostridium tetani is a normal inhabitant of soil and animal and human intestines. It is ubiquitous in the environment, especially where contamination by excreta is frequent.

D. Modes of Transmission

There is **no** person-to-person transmission of tetanus. Wounds, recognized or unrecognized, are the sites at which the organism enters the body, multiplies, and produces toxin. Cases of tetanus have followed injuries considered too trivial for medical consultation.

E. Incubation period

The incubation period ranges from 2 days to months, with most cases occurring within 14 days. In neonates the incubation period is usually 5 - 14 days. In general, shorter incubation periods are associated with more heavily contaminated wounds, more severe disease, and a worse prognosis.

F. Period of Communicability or Infectious Period

There is no infectious period because tetanus is not transmitted person-to-person.

G. Epidemiology

Tetanus occurs worldwide and is more frequent in warmer climates and months, partly because of the frequency of contaminated wounds. Despite the availability of tetanus toxoid (TT), tetanus continues to have a substantial health impact in the world. In 2011, neonatal tetanus alone accounted for an estimated 61,000 deaths worldwide. Tetanus is sporadic and relatively uncommon in the United States and most industrial countries, mostly because of widespread use of tetanus toxoid as part of routine immunizations and improved wound management. During 2001 through 2008, the last years for which data have been compiled, a total of 233 tetanus cases was reported, an average of 29 cases per year. Among the 197 cases with known outcomes the case-fatality rate was 13%. Almost all reported cases have occurred in people who had never been vaccinated or who completed a primary series but had not had a booster dose in the preceding 10 years. In the U.S., 49% tetanus cases occurred in persons 50 years of age or older. Neonatal tetanus is rare in the U.S., with only two cases reported since 1989. Neither of the infants' mothers had ever received tetanus toxoid.

Heroin users, particularly those who inject themselves subcutaneously with quinine-cut heroin, appear to be at high risk for tetanus. Quinine is used to dilute heroin and may actually favor growth of *C. tetani*.

Today, tetanus in the U.S. affects primarily older adults. The last reported case of neonatal tetanus in the U.S. occurred in 1998 in Montana in a newborn whose umbilical stump had been treated with nonsterile clay. The last case in Iowa was in 2013. From 1994 through 2008, Iowa had 6 cases of tetanus reported, 2 of which were known to be fatal. Both fatalities were elderly women who had never received Td vaccine. Elderly women may be at greater risk of illness and death because they may never have received vaccine. Males often were vaccinated in the military, thus may at least have some protection.

H. Bioterrorism Potential

None.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To assure early evaluation and, where appropriate, treatment with tetanus-diphtheria toxoid (Td) and/or tetanus immune globulin (TIG) and hospitalization.
- To identify groups and areas in which risk of disease is highest (due to under-immunization, occupation, other practices, etc.) to initiate prevention efforts, such as catch-up vaccination.

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing the Iowa Disease Surveillance System (IDSS). However, if IDSS is not available to your facility the reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698, mailing address:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th Street
Des Moines, IA 50319-0075

Postage-paid disease reporting forms are available free of charge from the IDPH clearinghouse. Call (319) 398-5133 or visit the website:

healthclearhouse.drugfreeinfo.org/cart.php?target=category&category_id=295 to request a supply.

C. Local Public Health Agency Follow-up Responsibilities

With assistance from the hospital infection preventionist, complete an investigation using the Iowa Disease Surveillance System (IDSS). The following data are epidemiologically important and should be collected in the course of case investigation. Additional information may be collected at the direction of IDPH.

Demographic information:

Name, Address, State of residence, Date of birth, Age, Sex, Ethnicity, Race, Occupation

Reporting Source:

County, Earliest date reported

Clinical:

Hospitalization and duration of stay, Date of onset of symptoms, Type of tetanus disease, Wound location and management, Complications, Pre-existing conditions (e.g., diabetes, chronic otitis media), Outcome (case survived or died), Date of death

Treatment:

Prophylaxis with Td and TIG, Date started,

Vaccine Information:

Dates of vaccination (prior tetanus toxoid history including Td, Tdap, etc), Time since last dose of tetanus-containing vaccine, Manufacturer of vaccine, Lot number, If not vaccinated, reason

Epidemiological:

Risk factors for disease such as history of a wound or injury, recent injection drug use, tattooing, or body piercing

For neonatal cases, maternal country or origin and number of years of residence in the U.S.

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

None.

B. Protection of Contacts of a Case

No immunization or prophylaxis is necessary for contacts of a case. If the patient is hospitalized, Standard Precautions should be used.

C. Preventive Measures

Personal Preventive Measures/Education

Vaccination, including routine childhood vaccination and tetanus-containing boosters beginning at age 11–12 years and continuing every 10 years thereafter, is the best preventive measure against tetanus. (Note: Tdap is recommended as a booster at age 11–12) Diphtheria-containing formulations should always be used and one dose with acellular pertussis vaccine. The Advisory Committee on Immunization Practices (ACIP) recommends that all children receive a routine series of five doses of tetanus- and diphtheria-containing vaccine at ages 2, 4, 6, and 15–18 months followed by a booster at 4–6 years of age. Booster doses of diphtheria and tetanus toxoids should be administered beginning at age 11–12 years (Tdap) (provided at least 5 years have passed since the last dose) and every 10 years thereafter (Td). DTaP and DT should be used in persons < 7 years of age, whereas Td is the preferred preparation for persons ≥ 7 years of age. The Td catch-up schedule for those starting immunization at ≥ 7 years of age consists of 3 doses. The second dose is usually given 1–2 months after the first dose, and the third dose 6 months after the second dose.

There are four vaccines used to prevent diphtheria, tetanus and pertussis: DTaP, Tdap, DT, and Td. Two of these (DTaP and DT) are given to children younger than 7 years of age, and two (Tdap and Td) are given to older children and adults. Several other combination vaccines contain DTaP along with other childhood vaccines. Children should get 5 doses of DTaP, one dose at each of the following ages: 2, 4, 6, and 15–18 months and 4–6 years. DT does not contain pertussis, and is used to complete the series if a child has a valid contraindication to pertussis vaccine. Td is a tetanus-diphtheria vaccine given to adolescents and adults as a booster shot every 10 years, or after an exposure to tetanus. Tdap is similar to Td but also contains protection against pertussis. A single dose of Tdap is recommended to replace one dose of Td. Tdap is licensed for ages 10 through 64 years. Healthcare providers and the public must be educated on the necessity of primary immunization with tetanus-diphtheria toxoid and 10-year booster doses; the hazards of puncture wounds and closed injuries, and the potential need after injury for active and/or passive prophylaxis. Because tetanus is preventable, each case should be considered a failure to vaccinate and should be used as a means of determining how to prevent further failures from occurring. Surveillance information should be used to raise awareness of the importance of immunization and to characterize persons or places in which additional efforts are required to raise immunization levels and decrease disease incidence.

Tetanus prophylaxis in patients with wounds is based on careful assessment of whether the wound is clean or contaminated, the immunization status of the patient, proper use of tetanus toxoid and/or TIG, wound cleaning and where required, surgical debridement and proper use of antibiotics.

Table 1. Guide to Tetanus Prophylaxis in Routine Wound Management

Vaccination History	Clean minor wounds		All other wounds ^a	
	Td ^{*b}	TIG ^c	Td [*]	TIG ^c
Unknown or < 3	Yes	No	Yes	Yes
> 3 doses ^d	No ⁺	No	No ^{**}	No

⁺Yes if more than 10 years since last dose

^{*}Tdap may be substituted for Td if the person has not previously received Tdap and is 10 years or older

^{**} Yes if more than 5 years since last dose

Environmental Measures

Sterilization of hospital supplies will prevent the infrequent instances of tetanus that may occur in a hospital from contaminated sutures, instruments, or plaster casts.

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Tetanus can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

References

- American Academy of Pediatrics. *Red Book 2009: Report of the Committee on Infectious Diseases, 28th Edition*. Illinois, Academy of Pediatrics, 2009.
- CDC. *Epidemiology & Prevention of Vaccine-Preventable Diseases: The Pink Book, 11th Edition*. CDC, January 2009.
- Manual for the Surveillance of Vaccine-Preventable Diseases*. 4th Edition CDC, 2008-2009.
www.cdc.gov/vaccines/pubs/surv-manual/
- CDC. Surveillance Summaries. Tetanus Surveillance-United States, 1995-1997. *MMWR*. July 3, 1998; 47:SS-2.
- Heymann, David L., ed. *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC, American Public Health Association, 2015.